DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS
RADIATION SAFETY SECTION
IONIZING RADIATION RULES

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PART 8. MEDICAL EXTREMITY X-RAY INSTALLATIONS

R 325.5361. Purpose and scope.

Rule 361. (1) This part establishes requirements governing the use of x-radiation in any healing arts discipline for human extremity radiography only. As used in this part "extremity radiography" means radiography of the hand or arm excluding the shaft of the humerus or the foot or leg excluding the shaft of the femur.

(2) This part applies to all registrants who use x-radiation for the intentional exposure of human extremities only.

(3) In addition to the requirements of this part all registrants are subject to parts 1, 4 and 5 and all applicable provisions of the other parts. Registrants using x-radiation for intentional human exposure other than or in addition to extremity radiography are subject to part 7.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

FIXED RADIOGRAPHIC INSTALLATIONS

R 325.5362. X-ray equipment.

Rule 362. (1) All x-ray tube housings in fixed radiographic installations shall be of the diagnostic type.

(2) The aluminum equivalent of the total filtration in the useful beam shall not be less than that shown in table I.

TABLE I

Operating kVp	Minimum Total Filter (Inherent plus added)
Below 50 kVp	0.5 mm aluminum
50-70 kVp	1.5 mm aluminum
Above 70 kVp	2.5 mm aluminum

(3) If the filter in the machine is not accessible for examination and the total filtration is not known subrule (2) may be assumed to have been met if the half-value layer is not less than

0.6 mm aluminum at 49 kVp
1.6 mm aluminum at 70 kVp
2.6 mm aluminum at 90 kVp

(4) Under conditions of subrule (3) for tube potentials above 90 kVp subrule (2) may be assumed to have been met if the half-value layer is not less than that specified in table 2 in rule 325 (5).

(5) Beam-limiting devices (diaphragms, cones, adjustable collimators), capable of restricting the useful beam to the area radiographically recorded shall be provided to define the beam and shall provide the same degree of attenuation as that required of the tube housing.

(6) Beam-limiting devices shall be calibrated in terms of the size of the projected useful beam at specified source-image distances (SID). The calibration shall be clearly and permanently recorded on the beam-limiting device. Calibration of adjustable beam-limiting devices shall permit reproducible settings.

(7) X-ray systems designed for only 1 image receptor size at a fixed SID shall be provided with means to limit the field at the plane of the image receptor to dimensions no greater than those of the image receptor, and to align the center of the x-ray field with the center of the image receptor to within 2% of the SID.

(8) The size of the x-ray beam projected by fixed aperture beam-limiting devices, except those used for stereoradiography, shall not exceed the dimensions of the image receptor by more than 2% of the SID when the axis of the x-ray beam is perpendicular to the plane of the image receptor.

(9) The calibrated field size indicator on adjustable beam-limiting devices shall be accurate to within 2% of the SID. The light field shall be aligned with the x-ray field with the same degree of accuracy. The field size projected by automatic adjustable collimators shall provide the same precision.

(10) For radiographic procedures resulting in multiple views on a single x-ray film the beam-limiting device shall limit the x-ray field size to the recorded radiographic image size within 2% of the SID. Covering a portion of the radiographic film with radio-opaque material is not a substitute for proper x-ray field limitation.

(11) A device shall be provided which terminates the exposure at a preset time interval or exposure limit. The operator shall be able to terminate the exposure at any time by discontinuing pressure upon the exposure switch.

(12) Unless protective shielding is provided for the operator, the length of the exposure control switch cord or remote control location shall be such that the operator shall be able to stand at least 1.8 meters (6 feet) away from the patient and the x-ray tube and out of the useful beam. When protective shielding is provided, the operator shall always be entirely behind the shield during the exposure.

(13) The control panel shall provide positive identification of the production of x-rays whenever the x-ray tube is energized. A milliammeter may comply with this subrule.

(14) The technique factors to be used during an exposure shall be indicated before the exposure begins, except when automatic exposure controls are used, in which case the technique factors which are set prior to the exposure shall be indicated. On equipment having fixed technique factors, this requirement may be met by permanent markings. Indication of technique factors shall be visible from the operator's position.

(15) On radiographic x-ray machines manufactured after the effective date of these rules a signal audible to the operator shall indicate that the exposure has ended.

(16) X-ray equipment installed after the effective date of these rules shall be installed and used in accord with the appropriate portions of the 1975 national electrical code (NFPA No. 70-1975) reproduced or referenced in rule 359. X-ray equipment installed before the effective date of these rules shall conform with the appropriate national electrical code in effect at the time of installation.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5365. Enclosures.

Rule 365. (1) The degree of protection required for an enclosure shall be determined by the workload, use and occupancy factors and the kilovoltage, milliamperage, mechanical movement and distance factor, and shall be subject to design approval by the department.

(2) Radiographic-room wall and floor areas exposed to the useful beam plus an area extending at least 30 centimeters (1 foot) beyond shall be provided with a primary protective barrier where necessary as determined by workload, use, occupancy and distance factors.

(3) Secondary protective barriers shall be provided in the radiographic room ceiling and in those walls not requiring primary barriers. Common building materials often fulfill this requirement.

(4) A fixed barrier of 1.6 millimeters (1/16 inch) lead equivalence, such as a shielded wall partition or immobilized portable shield, is recommended for operator protection. When this protection is provided the operator shall be able to see and communicate with the patient from a shielded position.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

R 325.5366. Conditions of operation.

Rule 366. (1) An operator shall properly utilize the beam-limiting devices provided to restrict the useful beam to the smallest area consistent with clinical requirements. Particular care shall be taken to align accurately the x-ray beam with the patient and film.

(2) The operator shall insure the presence of adequate filtration before any radiographic procedure.

(3) Staff personnel routinely working with or around radiation sources shall not be required by the licensee or registrant to hold film or restrain patients during radiography. If such procedure is permitted personnel exposure shall not exceed rule 205 or the procedure shall be prohibited.

(4) When a patient must be held in position for radiography, mechanical supporting or restraining devices shall be available and shall be used unless contraindicated. If the patient must be held by an individual, this individual shall wear protective gloves and a protective apron of 0.5 millimeter minimum lead equivalence and he shall be so positioned that no part of his body will be struck by the useful beam and that his body is as far as possible from the edge of the useful beam.

(5) During each exposure, the operator shall stand at least 1.8 meters (6 feet) from the patient and the x-ray tube and outside the useful beam or behind a suitable barrier.

(6) Only individuals whose presence is necessary shall be permitted in the radiographic room during exposure. Each individual, except the patient, shall be protected by 0.5 millimeter minimum lead equivalent aprons unless protected by an approved primary barrier.

(7) Personnel monitoring shall be performed in controlled areas for each individual occupationally exposed to ionizing radiation from diagnostic x-ray equipment. Personnel monitoring devices, such as film badge dosimeters or thermoluminescent dosimeters, shall be permanently assigned to each occupationally exposed individual. This monitoring shall be continuous during employment as a radiation worker.

(8) Personnel exposure records shall be kept on permanent available file at the facility where the exposure occurs.

(9) Monitoring devices used to estimate whole body exposure shall normally be worn on the chest or abdomen. Monitoring of any other body part shall comply with rule 222.

(10) Monitoring devices worn to estimate personnel occupational exposure shall not be worn by the individual when he is exposed as a patient for any medical or dental reason.

(11) The gonads of children and persons who have not passed the reproductive age shall be protected from the useful beam either by the use of shielding (0.5 mm lead equivalent), collimation, or special gonad shields. Special gonadal aprons (0.25 mm lead equivalent) are commercially available and recommended for patient protection from secondary radiation.

(12) Intensifying screens shall be employed to reduce patient exposure except in cases where a noticeable decrease in image definition may reduce the clinical value of the examination. Film and screen speed combinations shall be carefully selected to produce the necessary clinical information with the least exposure to the patient consistent with current clinical judgment.

(13) Film processing materials and techniques shall be those recommended by the x-ray film and processing materials manufacturers unless otherwise tested to insure maximum information content of the developed film. Sight developing shall not be permitted except under extreme emergency conditions. Correct temperature control and

development time are necessary to minimize radiation dose to the patient.

(14) A radiographic x-ray system shall not be left unattended without locking the apparatus, room or building in some manner which will prevent use of the apparatus by unauthorized persons.

History: 1954 ACS 85, Eff. Dec. 3, 1975.

MOBILE OR PORTABLE RADIOGRAPHIC EQUIPMENT

R 325.5368. General provisions.

Rule 368. (1) Radiographic x-ray equipment shall comply with the general requirements of rule 362.

(2) Mobile or portable radiographic x-ray equipment used routinely in 1 location shall be considered a fixed installation and enclosures shall comply with the general requirements of rule 365.

(3) Operation shall comply with the general requirements of rule 366.

History: 1954 ACS 85, Eff. Dec. 3, 1975.